

UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE  
General Certificate of Education Ordinary Level

**CHEMISTRY**

**5070/1**

PAPER 1 Multiple Choice

Friday

**18 JUNE 1999**

Morning

1 hour

Additional materials:

Electronic calculator and/or Mathematical tables

Multiple choice answer sheet

Soft clean eraser

Soft pencil (type B or HB is recommended)

**TIME** 1 hour

**INSTRUCTIONS TO CANDIDATES**

**Do not open this booklet until you are told to do so.**

Write your name, Centre number and candidate number on the answer sheet in the spaces provided unless this has already been done for you.

There are **forty** questions in this paper. Answer **all** questions. For each question, there are four possible answers, **A, B, C** and **D**. Choose the **one** you consider correct and record your choice in **soft pencil** on the separate answer sheet.

**Read very carefully the instructions on the answer sheet.**

**INFORMATION FOR CANDIDATES**

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this booklet.

Mathematical tables are available. You may use a calculator.

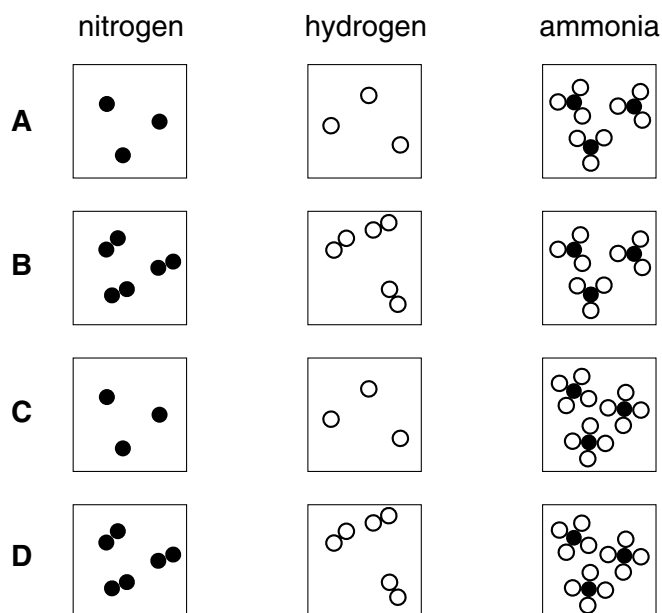
A copy of the Periodic Table is printed on page 16.

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**This question paper consists of 16 printed pages.**

- 1 In the Haber process, nitrogen and hydrogen react to form ammonia.

Which set of diagrams represents the molecules of nitrogen, hydrogen and ammonia?



- 2 An ion  $X^+$  has 23 nucleons and 10 electrons.

What does the nucleus of the ion  $X^+$  contain?

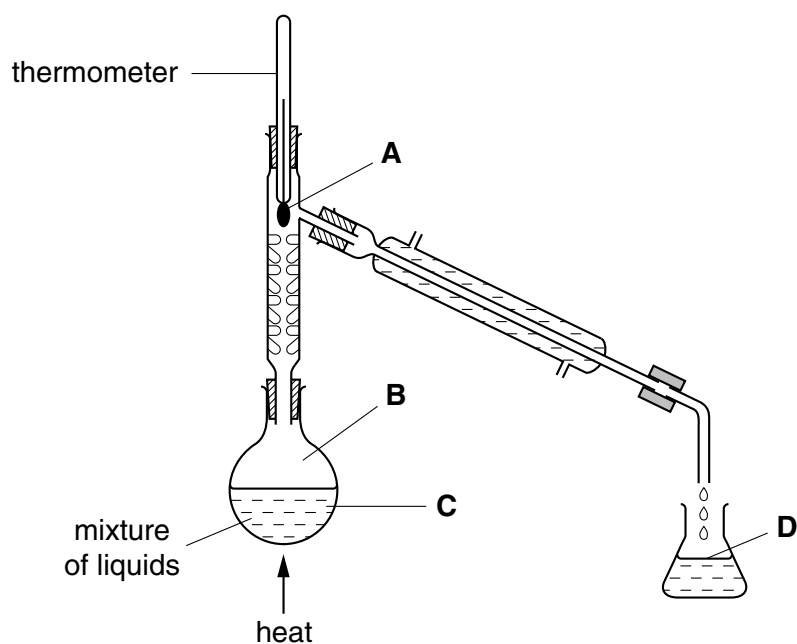
	protons	neutrons
A	12	11
B	11	12
C	10	13
D	9	14

- 3 Which of the following has the highest electrical conductivity?

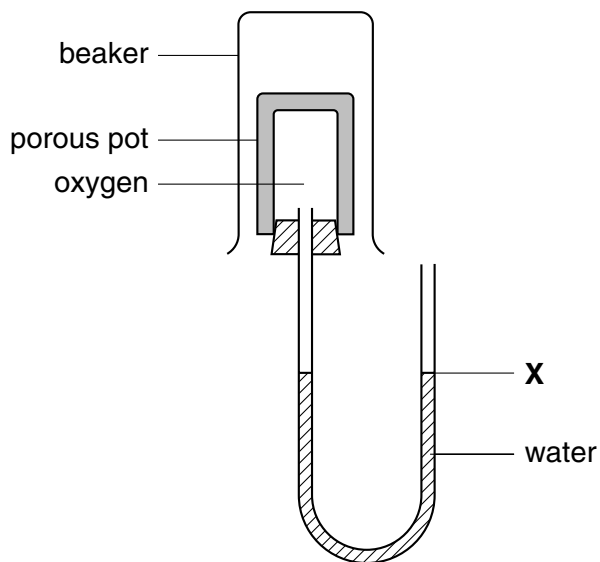
- A aqueous sugar solution
- B solid graphite
- C solid sodium chloride
- D gaseous carbon dioxide

- 4 A mixture of two liquids in equal proportions is fractionally distilled.

When the thermometer first shows a steady reading, at which point will there be the greater proportion of the liquid with the higher boiling point?



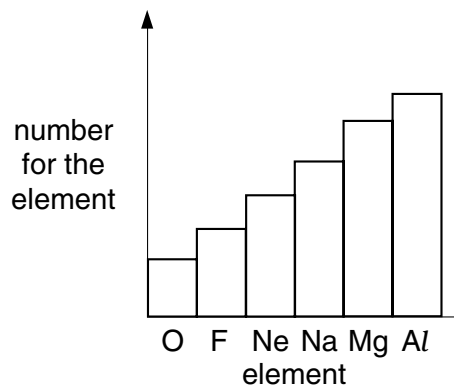
- 5 The apparatus shown is set up, using different gases in the beaker.



Which gas, when present in the beaker, causes the water level at X to rise?

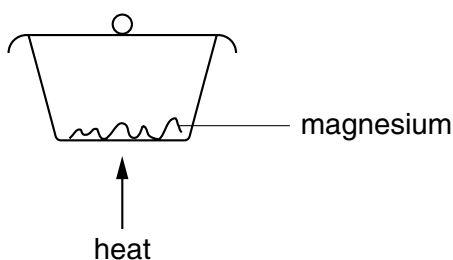
- A carbon dioxide,  $\text{CO}_2$
- B chlorine,  $\text{Cl}_2$
- C nitrogen dioxide,  $\text{NO}_2$
- D methane,  $\text{CH}_4$

- 6 A number for the elements from oxygen to aluminium changes as shown.



What is this number?

- A the Group number of the element in the Periodic Table
  - B the number of electron shells in an atom
  - C the number of electrons in the outer shell of an atom
  - D the number of protons in an atom
- 7 In an experiment to find the formula of magnesium oxide, magnesium metal is heated in a covered crucible.



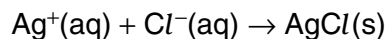
Why is the crucible covered with a loose-fitting lid?

- A to prevent air escaping from the crucible
  - B to prevent magnesium carbonate forming
  - C to prevent magnesium oxide escaping from the crucible
  - D to prevent water vapour entering the crucible
- 8 A solid element conducts electricity. The element burns in air to form a white solid. This white solid dissolves in water to give an alkaline solution.

What is the element?

- A aluminium
- B calcium
- C carbon
- D copper

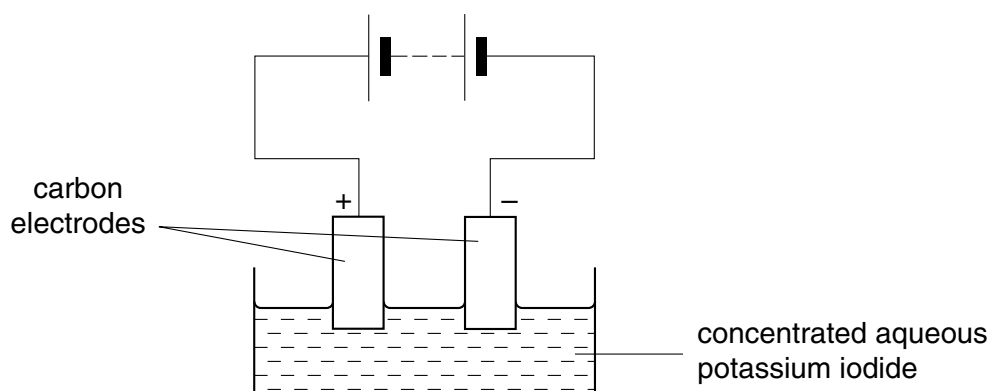
- 9 Silver ions react with chloride ions.



It is found that  $5 \text{ cm}^3$  of a  $0.1 \text{ mol/dm}^3$  solution of the chloride of metal  $X$  needs  $10 \text{ cm}^3$  of  $0.1 \text{ mol/dm}^3$  silver nitrate for complete reaction.

What is the formula of the chloride?

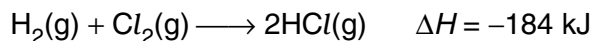
- A  $\text{XCl}_4$       B  $\text{XCl}_2$       C  $\text{XCl}$       D  $\text{X}_2\text{Cl}$
- 10 Which equation represents the combustion of methane with the products collected at  $120^\circ\text{C}$ ?
- A  $\text{CH}_4(\text{l}) + 2\text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{l})$   
 B  $\text{CH}_4(\text{g}) + 2\text{O}_2(\text{l}) \rightarrow \text{CO}_2(\text{s}) + 2\text{H}_2\text{O}(\text{l})$   
 C  $\text{CH}_4(\text{g}) + 2\text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{g})$   
 D  $\text{CH}_4(\text{l}) + 2\text{O}_2(\text{l}) \rightarrow \text{CO}_2(\text{l}) + 2\text{H}_2\text{O}(\text{s})$
- 11 Which change **always** takes place when aqueous copper(II) sulphate is electrolysed?
- A Copper is deposited at the negative electrode.  
 B Oxygen is evolved at the positive electrode.  
 C Sulphate ions move towards the negative electrode.  
 D The colour of the solution fades.
- 12 The electrolysis shown in the diagram is set up.



What is observed?

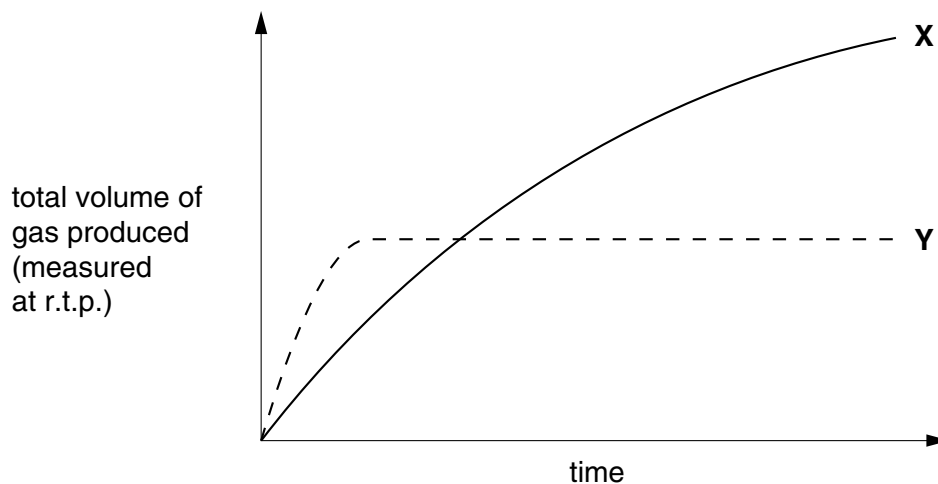
	at positive electrode	at negative electrode
A	solution turns brown	bubbles of colourless gas
B	solution turns brown	silvery droplets
C	bubbles of colourless gas	bubbles of colourless gas
D	bubbles of colourless gas	solution turns brown

- 13 Hydrogen reacts with chlorine.



Why does  $\Delta H$  for this reaction have a negative sign?

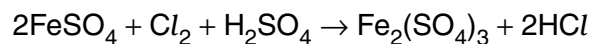
- A Hydrogen and chlorine are covalent, but hydrogen chloride is ionic.
- B More bonds are formed than are broken.
- C The total energy of bond breaking is less than that of bond forming.
- D The speed of the reaction increases as temperature increases.
- 14 Why is vanadium(V) oxide used in the oxidation of sulphur dioxide to sulphur trioxide?
- A It acts as a reducing agent.
- B It prevents the decomposition of sulphur trioxide.
- C It removes impurities.
- D It speeds up the reaction.
- 15 In the graph, curve X represents the results of the reaction between 1.0 g of granulated zinc and an excess of acid at 30 °C.



Which changes will produce curve Y?

- A using 1.0 g of powdered zinc at 20 °C
- B using 1.0 g of granulated zinc at 20 °C
- C using 0.5 g of granulated zinc at 40 °C
- D using 0.5 g of granulated zinc at 20 °C

16 Which element in the reaction below is oxidised?



- A chlorine
- B hydrogen
- C iron
- D sulphur

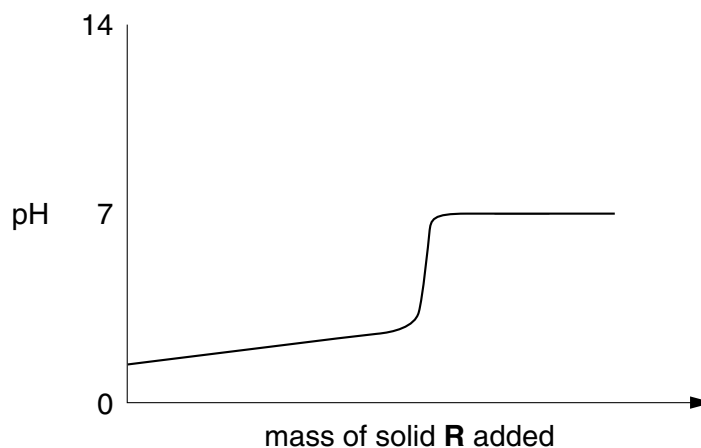
17 The word equation shows a chemical reaction.



What could substance **Y** be?

- A copper(II) oxide
- B magnesium
- C sodium carbonate
- D sodium hydroxide

18 Solid **R** is gradually added to aqueous solution **S**. The changes in pH are shown on the graph.



What are **R** and **S**?

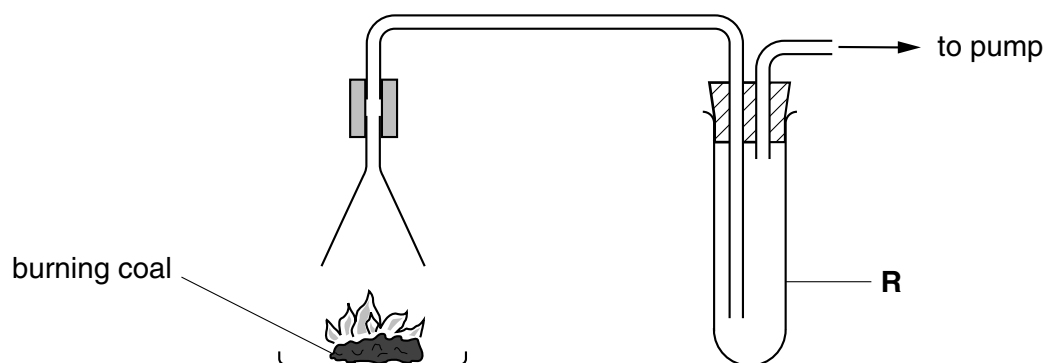
	<b>R</b>	<b>S</b>
<b>A</b>	insoluble metal oxide	hydrochloric acid
<b>B</b>	insoluble non-metal oxide	sodium hydroxide
<b>C</b>	soluble metal oxide	hydrochloric acid
<b>D</b>	soluble non-metal oxide	sodium hydroxide

- 19 A solution **X** forms a white precipitate with dilute sulphuric acid and also with aqueous silver nitrate.

What could solution **X** contain?

- A barium chloride
- B barium nitrate
- C magnesium chloride
- D magnesium sulphate

- 20 The diagram shows apparatus used to test the gases produced by burning coal.



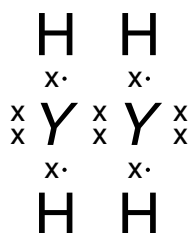
Which substance is placed in tube **R** to show that sulphur dioxide is formed?

- A aqueous potassium dichromate(VI)
  - B aqueous potassium iodide
  - C damp red litmus paper
  - D limewater
- 21 Which of the following is a typical property of transition metals?
- A They form coloured compounds.
  - B They have low densities.
  - C They have low melting points.
  - D They react with cold water to give hydrogen.



22 The structure of a compound containing an element Y and hydrogen is represented as shown.

Only outer shell electrons are shown.



key

x = electron from Y

· = electron from H

To which group of the Periodic Table does element Y belong?

A III

B IV

C V

D VI

23 The diagram shows the positions of four elements in the Periodic Table.

Which element gains electrons to form negatively charged ions?

I	II	III	IV	V	VI	VII	0
							A
D			C			B	

24 Which substance can be reduced by heating with carbon?

A aluminium oxide

B calcium carbonate

C iron(III) oxide

D magnesium oxide

25 What happens when zinc is placed in aqueous copper(II) sulphate?

A Copper atoms are oxidised.

B Zinc atoms are oxidised.

C Copper ions are oxidised.

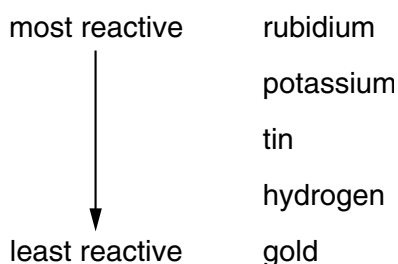
D Zinc ions are oxidised.

26 The table shows some typical properties of metals and non-metals.

Which properties for a metal and for a non-metal are both correct?

	metals	non-metals
<b>A</b>	do not conduct electricity	usually have a low melting point
<b>B</b>	usually have a high melting point	good conductor of heat
<b>C</b>	shiny when polished	good conductor of electricity
<b>D</b>	good conductor of electricity	usually dull in appearance

27 The list shows four metals and hydrogen in order of reactivity.



Which of the following do **not** give hydrogen as a product?

- A** The adding of rubidium to water.
- B** The adding of tin to dilute hydrochloric acid.
- C** The electrolysis of aqueous gold chloride.
- D** The electrolysis of aqueous rubidium chloride.

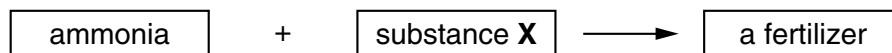
28 Which substance does **not** need air as a raw material for its manufacture?

- A** ammonia
- B** iron
- C** sodium
- D** sulphuric acid

29 Which of the following is a reaction of dilute hydrochloric acid?

- A** Ammonium chloride reacts to give ammonia.
- B** Calcium carbonate reacts to give carbon dioxide.
- C** Copper reacts to give hydrogen.
- D** Universal Indicator paper turns blue.

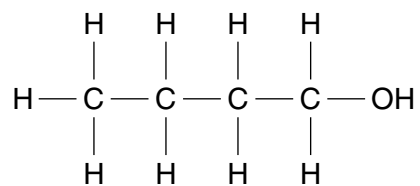
30 The diagram shows a reaction used to manufacture a fertilizer.



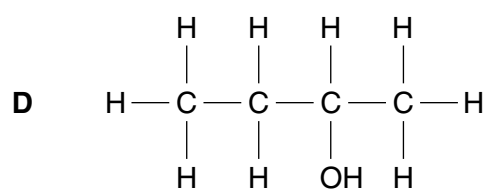
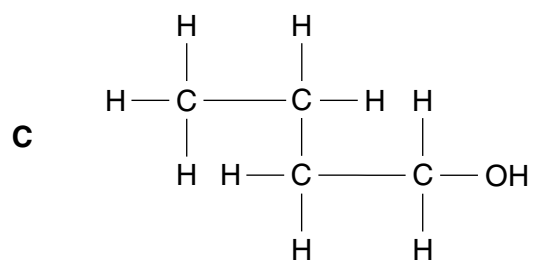
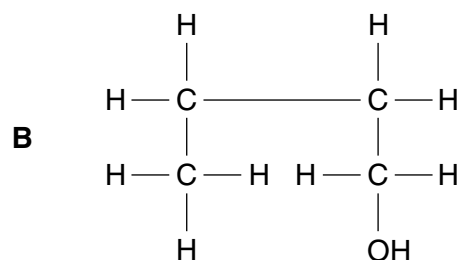
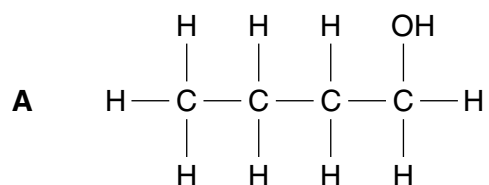
What could substance **X** be?

- A lime (calcium oxide)
  - B nitrogen
  - C potassium hydroxide
  - D sulphuric acid
- 31 Which of the following is **not** a use of silicon or its compounds?
- A making fire-resistant plastics
  - B making glass
  - C making polishes
  - D making smokeless fuel
- 32 Which statement best confirms that two substances are allotropes of carbon?
- A They both reduce heated iron(III) oxide to iron.
  - B They have different crystalline structures.
  - C Equal masses of the substances require equal masses of oxygen for complete combustion.
  - D Equal masses of the substances give equal masses of carbon dioxide, and no other product, when completely burnt in oxygen.

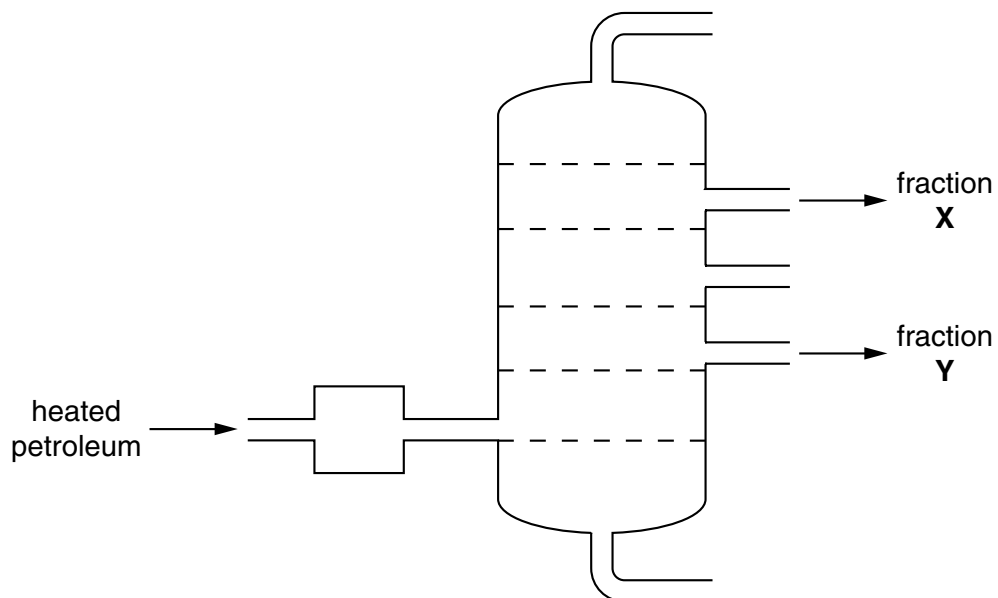
33 The structure of butan-1-ol is shown.



Which structure is an isomer of that shown above?



34 The diagram shows the fractional distillation of petroleum.



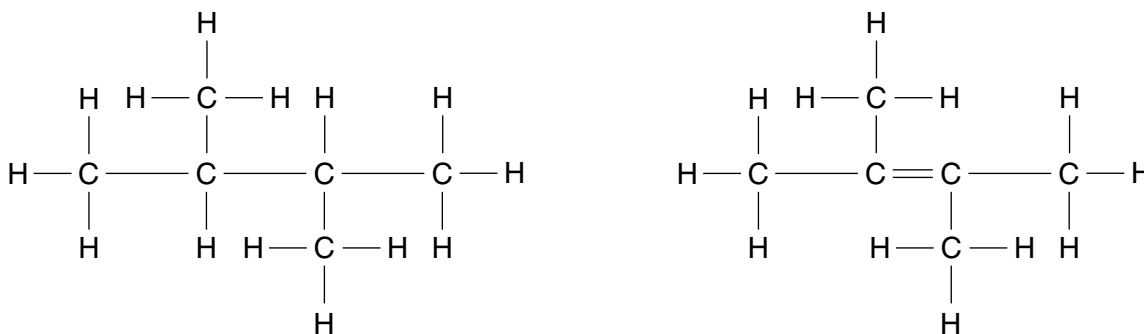
Which statements about fractions **X** and **Y** are correct?

	<b>X</b> burns more easily than <b>Y</b>	<b>X</b> has a higher boiling point than <b>Y</b>
<b>A</b>	yes	yes
<b>B</b>	yes	no
<b>C</b>	no	yes
<b>D</b>	no	no

35 Which set contains all the possible combustion products of methane,  $\text{CH}_4$ ?

- A** carbon, carbon dioxide, carbon monoxide and water
- B** carbon, carbon monoxide and hydrogen
- C** carbon dioxide, carbon monoxide, hydrogen and water
- D** carbon monoxide and water

36 The structures of two compounds are shown.



Which statement about these two compounds is correct?

- A They are both hydrocarbons.
  - B They are both saturated compounds.
  - C They are in the same homologous series.
  - D They are isomers of each other.
- 37 Equal masses of coconut oil, butter, margarine and palm oil are separately dissolved in an organic solvent.

A few drops of aqueous bromine are added to each solution and the mixtures are shaken.

The table shows the results.

Which sample contains the most unsaturation?

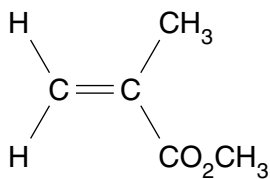
	sample	colour of mixture
A	butter	orange
B	coconut oil	dark orange
C	margarine	yellow
D	palm oil	colourless

38 When an animal fat is boiled with aqueous sodium hydroxide, a soap and glycerol are formed.

This reaction is an example of

- A esterification.
- B fermentation.
- C hydrolysis.
- D polymerisation.

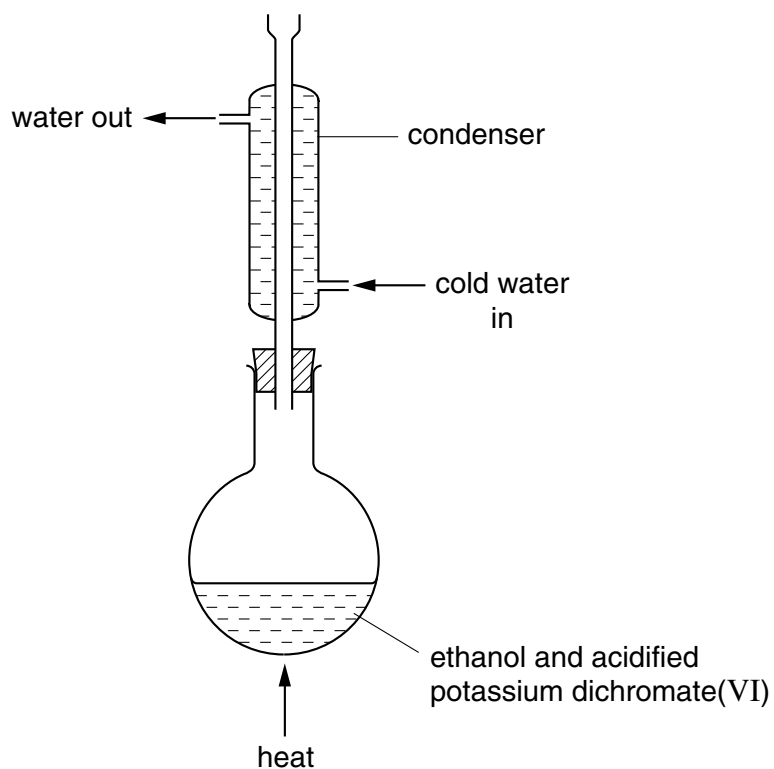
39 The structure of the monomer of *Perspex* is shown.



Which description of *Perspex* is correct?

	type of polymer	polymer formed by
<b>A</b>	carbohydrate	condensation polymerisation
<b>B</b>	ester	addition polymerisation
<b>C</b>	hydrocarbon	addition polymerisation
<b>D</b>	polyester	condensation polymerisation

40 The apparatus shown was set up to prepare ethanoic acid from ethanol.



What was the purpose of the condenser?

- A** to make sure air does not react with ethanol
- B** to stop ethanoic acid changing back to ethanol
- C** to stop ethanol being converted into ethene
- D** to stop ethanol vapour escaping

**DATA SHEET**  
**The Periodic Table of the Elements**

I		II		Group										VII		VIII		IX		X		XI		XII		XIII		XIV		XV		XVI		XVII		XVIII																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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\*58-71 Lanthanoid series  
†90-103 Actinoid series

**Key**  

a	<b>X</b>
b	<b>X</b>

  
 a = relative atomic mass  
 X = atomic symbol  
 b = proton (atomic) number

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).